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ABSTRACT

The general purpose of the occupational analysis is to provide workable, basic information dealing with the many and varied duties performed in the telecommunications occupation. The telecommunications job cluster includes such areas as the telephone, two-way radio, cable TV, data transfer, teletype, and other allied fields. The document opens with a brief introduction followed by a job description. The bulk of the document is presented in table form. Seven duties are broken down into a number of tasks and for each task a table is presented, showing: tools, equipment, materials, objects acted upon; performance knowledge; safety--hazard; science; math--number systems; and communications. The duties include: install framework; mount equipment and apparatus; run cables and connect wires; perform basic tests on equipment; perform complex tests; troubleshoot equipment; and perform maintenance, modification, and repair of equipment. (BP)

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Occupational Analysis

CE 004 197

TELECOMMUNICATIONS

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Instructional Materials Laboratory
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5109

AN ANALYSIS OF THE TELECOMMUNICATIONS OCCUPATION

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FOREWORD

The occupational analysis project was conducted by The Instructional Materials Laboratory, Trade and Industrial Education, The Ohio State University in conjunction with the State Department of Education, Division of Vocational Education pursuant to a grant from the U.S. Office of Education.

The Occupational Analysis project was proposed and conducted to train vocational educators in the techniques of making a comprehensive occupational analysis. Instructors were selected from Agriculture, Business, Distributive, Home Economics, and Trade and Industrial Education to gain experience in developing analysis documents for sixty-one different occupations. Representatives from Business, Industry, Medicine, and Education were involved with the vocational instructors in conducting the analysis process.

The project was conducted in three phases. Phase one involved the planning and development of the project strategies. The analysis process was based on sound principles of learning and behavior. Phase two was the identification, selection and orientation of all participants. The training and workshop sessions constituted the third phase. Two-week workshops were held during which teams of vocational instructors conducted an analysis of the occupations in which they had employment experience. The instructors were assisted by both occupational consultants and subject matter specialists.

The project resulted in producing one hundred two trained vocational instructors capable of conducting and assisting in a comprehensive analysis of various occupations. Occupational analysis data were generated for sixty-one occupations. The analysis inlcuded a statement of the various tasks performed in each occupation. For each task the following items were identified: tools and equipment; procedural knowledge; safety knowledge; concepts and skills of mathematics, science and communication needed for successful performance in the occupation. The analysis data provided a basis for generating instructional materials, course outlines, student performance objectives, criterion measures, as well as identifying specific supporting skills and knowledge in the academic subject areas.

PREFACE

In this document we have described the job, duties and tasks from a behavioral standpoint, analyzing it as to what the worker does, what mental processes he uses, and how he reacts to the work situation.

Specifically, we have chosen a job cluster and called it telecommunications, defining it as the area of telephone, two-way radio, cable TV, data transfer, teletype, facsimile and other allied fields.

We have analyzed this job cluster, using the above criteria and feel that this analysis documents the performance skills necessary for the individual to function as a craftsman.

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JOB DESCRIPTION

The telecommunications specialist installs and modifies telephone, two-way radio, cable TV, data teletype, facsimile and other systems that deal with the transmission of intelligence over a distance. He/she checks completed systems to determine that operation is within specified parameters, using electronic test equipment and hand tools; physically inspects, cleans and measures operating systems, makes adjustments and replacements, using electronic test equipment and hand tools as required. The specialist analyzes failures and causes, replaces faulty components or modules and returns system to specified operating parameters.

Duty A Install Framework

1 Determine material needs
2 Obtain material
3 Determine location
4 Drill holes and cut material
5 Assemble framework

(TASK STATEMENT) DETERMINE MATERIAL NEEDS FOR FRAME WORK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
SPECIFICATIONS PRINTS REQUISITIONS RULER TAPE CHALK LINE PLUMB BOB LADDERS HARD HAT SAFETY GLASSES	IDENTIFY TYPES & STYLES OF: HARDWARE FASTENERS STRUCTURAL MATERIAL PIPE & CONDUIT RECOGNIZE AND IDENTIFY EACH UNIT C PART BY SYMBOL OR CODE ASSIGNED	LADDER ENVIRONMENTAL OBSTRUCTIONS

SCIENCE	MATH - NUMBER SYSTEMS	COMMUNICATIONS
ARRANGEMENT OF MOLECULES, ATOMS AND IONS AND THE EFFECT ON STRUCTURE AND STRENGTH OF MATERIAL [VALUE JUDGMENT-STRENGTH OF MATERIALS] RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Examples: BENDING, TWISTING, STRETCHING.)	ADDITION AND SUBTRACTION OF WHOLE NUMBERS MEASURES OF LENGTH (Examples: INCHES, FEET, ETC.) [STANDARD RULER TO 1/8"] READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS MEASURES OF WEIGHT [VISUAL ESTIMATE]	READING COMPREHENSION [BLUEPRINT COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATION REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION COMPLETING REQUISTION] PENMANSHIP

(TASK STATEMENT) OBTAIN MATERIAL FOR FRAME WORK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
REQUISITIONS PURCHASE ORDERS PACKING SLIPS SHIPPING INVOICES BILLS OF LADING DOLLIES HAND TRUCKS CHARTS HAMMER RIPPING CHISEL CUTTERS METAL BAND STRUCTURAL MATERIALS FASTENERS HARDWARE SHORTAGE REPORTS CLAIMS PIPE AND CONDUIT	IDENTIFY TYPES AND STYLES OF: HARDWARE FASTENERS STRUCTURAL MATERIAL PIPE AND CONDUIT RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY SYMBOL OR CODE ASSIGNED	PACKING MATERIAL REFUSE MATERIAL HANDLING TECHNIQUE HAND TRUCK, DOLLY LIFTING
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
ARRANGEMENT OF MOLECULES, ATOMS AND IONS AND THE EFFECT ON STRUCTURE AND STRENGTH OF MATERIALS [VALUE JUDGMENT–STRENGTH OF MATERIALS] RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Examples: BENDING, TWISTING, STRETCHING.) SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Examples: LEVERS, GEARS, PULLEYS)	ADDITION AND SUBTRACTION OF WHOLE NUMBERS MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/8"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS MEASURES OF WEIGHT [VALUE JUDGMENT] NUMBERING SCHEME [UNITS, TENS, DOZEN, GROSS]	READING COMPREHENSION [BLUEPRINT & DRAWING COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS & REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION COMPLETING REPORTS] PENMANSHIP

(TASK STATEMENT) DETERMINE LOCATION FOR FRAME WORK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
TAPES RULERS PLUMB BOBS LEVELS CHALK LINES STRAIGHT EDGE LADDERS HARD HAT SAFETY GLASSES SQUARE MARKING DEVICES SPECIFICATIONS BLUEPRINTS DRAWINGS	CONCEPTUAL RELATIONSHIPS BETWEEN THE PLANES OF RELATED STRUCTURAL MATERIAL MINOR DRAFTING SKILLS MAKE PROPER MARKS TO INDICATE POSITION OF HANGERS, ANCHORS, FASTENERS, ETC	LADDER ENVIRONMENTAL OBSTRUCTIONS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
NONE	ADDITION AND SUBTRACTION OF WHOLE NUMBERS MULTIPLICATION AND DIVISION WITH WHOLE NUMBERS REDUCTION OF FRACTIONS (Example 12/16 = 3/4) ADDITION AND SUBTRACTION OF PROPER (example: 3/4) AND IMPROPER (example: 11/8) FRACTIONS. MULTIPLICATION AND DIVISION OR PROPER AND IMPROPER FRACTIONS CHANGING MIXED NUMBERS TO IMPROPER FRACTIONS (Example: 4 3/4 = 19/4) ADDITION AND SUBTRACTION OF DECIMAL FRACTIONS MULTIPLICATION AND DIVISION OF DECIMAL FRACTIONS MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"] ROUNDING OFF DECIMALS AND WHOLE NUMBERS (Example: .4877 = .488 when round to three decimal places.) READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS AND REPORTS]

(TASK STATEMENT) DRILL HOLES AND CUT MATERIAL FOR FRAME WORK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
SPECIFICATION, DRAWINGS, BLUEPRINTS ELECTRIC DRILLS ELECTROPNEUMATIC HAMMER DRILL CENTER PUNCH HAMMERS TWIST BITS CARBOLLOY BITS WOOD BITS HARD HAT SAFETY GLASSES HOLE PUNCHES TAP SET LADDER SCAFFOLDING SAWS	CHOICE OF DRILLING INSTRUMENT TO MATCH COMPOSITION OF MATERIAL RECOGNIZE POSITIONAL MARKS DETERMINE DIAMETER AND DEPTH OF HOLE RELATIONSHIP OF DRILL BIT SIZE TO FASTENER USED CHOOSE PROPER SIZE DRILL AND TAP TO MATCH FASTENER	DO NOT DRILL THROUGH ANYTHING WITHOUT KNOWING WHAT IS BEHIND THE SURFACE; POSSIBLE DAMAGE TO MATERIALS, PERSONNEL EQUIPMENT LADDER AND SCAFFOLDING

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
EFFECTS OF FRICTION ON WORK PROCESSES AND PRODUCT QUALITY [DRILLING] SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE. (Examples: LEVERS, GEARS, PULLEYS.)	MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER 1/32"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT COMPREHENSION]

(TASK STATEMENT) ASSEMBLE FRAME WORK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
HAMMER HACK SAW SCREW DRIVER SOCKET SET ADJ. WRENCH OPEN END WRENCH LEVEL SQUARE PLUMB BOB MALLET FILE PLIERS DRIFT PINS TAPE RULER ROPE AND CHAIN HOISTS SAFETY GLASSES HARD HAT LADDER SCAFFOLDING SPECIFICATIONS BLUEPRINTS DRAWINGS	RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY SYMBOL OR CODE ASSIGNED CONCEPTUALIZE LOGICAL SEQUENCE OF ASSEMBLY CONCEPT OF ABSTRACT RELATIONSHIPS VARYING FROM SITUATION TO SITUATION THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT RELATIONSHIP OF PARTS TO THEIR WHOLE MINOR DRAFTING SKILLS	SHARP EDGES PUNCTURE WOUNDS WEIGHT, LIFTING AND PULLING LADDERS AND SCAFFOLDING

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Example: LEVERS, GEARS, PULLEYS) METALLURUGY – LIMITED TO RIGIDITY TENSILE STRENGTH ELASTICITY YIELD	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS MEASURES OF WEIGHTS [VISUAL ESTIMATE] MEASURES OF LENGTH (Examples: INCHES FEET, ETC.) [STANDARD RULER TO 1/32"]	READING COMPREHENSION [BLUEPRINT COMPREHENSION] INTERPRET CONCEPTUAL DRAWINGS

Duty B Mount Equipment and Apparatus

1 Inventory equipment
2 Determine mounting location
3 Select proper unit for location
4 Mount and secure units and apparatus
5 Identify and designate equipment

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(TASK STATEMENT) INVENTORY EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
PENCIL STOCK LIST SHIPPLING LIST SPECIFICATIONS PARTS LIST BOX OPENER CUTTER, STEEL BAND HAMMER RIPPING CHISEL TAPE MEASURE	RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY SYMBOL OR CODE ASSIGNED	PACKING MATERIAL REFUSE MATERIAL HANDLING TECHNIQUES HAND TRUCKS, DOLLIES WEIGHT, LIFTING AND PULLING
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Example: LEVERS, GEARS, PULLEYS.)	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS NUMBERING SCHEME [UNITS, TENS, DOZEN, GROSS]	READING COMPREHENSION [BLUEPRINT COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY] COMPLETING REPORTS PENMANSHIP INTERPRETING PARTS LIST

(TASK STATEMENT) DETERMINE MOUNTING LOCATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
MARKING INSTRUMENTS RULER TAPE MEASURE LEVEL SQUARE SPECIFICATIONS DRAWINGS MANUALS	LOGICAL SEQUENCE THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT OF PARTS TO THEIR WHOLE	NONE

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
NONE	ADDITION AND SUBTRACTION OF WHOLE NUMBERS MULTIPLICATION AND DIVISION WITH WHOLE NUMBERS REDUCTION OF FRACTIONS (Example: 12/16 = 3/4) ADDITION AND SUBTRACTION OF PROPER (example 3/4) AND IMPROPER (example 11/8) FRACTIONS MULTIPLICATION AND DIVISION OF PROPER AND IMPROPER FRACTION ADDITION AND SUBTRACTION OF DECIMAL FRACTIONS MEASURES OF LENGTHS (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

(TASK STATEMENT) SELECT PROPER UNIT FOR LOCATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
UNITS AND APPARATUS MARKING INSTRUMENTS TAGS SPECIFICATIONS DRAWINGS MANUALS	RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY SYMBOL OR CODE ASSIGNED LOGICAL SEQUENCE THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT PARTS TO THEIR WHOLE	NONE
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
NONE	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT COMPREHENSION] TECHNICAL TERMINOLOGY [TECHNICAL VOCABULARY AND ABBREVIATIONS]

(TASK STATEMENT) MOUNT AND SECURE UNITS AND APPARATUS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
ROPES AND HOISTS SCREW DRIVERS WRENCHES DRIFT PINS FASTENERS UNITS AND APPARATUS LADDERS AND SCAFFOLDS HARD HAT AND SAFETY GLASSES SPECIFICATIONS BLUEPRINTS DRAWINGS	RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY SYMBOL OR CODE ASSIGNED LOGICAL SEQUENCE THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT PARTS TO THEIR WHOLE	LIFTING HEAVY UNITS LADDERS AND SCAFFOLDING HAZARD TO DELICATE APPARATUS DUE TO PHYSICAL SHOCK OR ABUSE
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Example: LEVERS, GEARS, PULLEYS) METALLURGY – TENSION AND STRESS IN FASTENERS	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS	INTERPRET DESIGNATIONS OR MARKS ON FRAME WORK AND DRAWINGS READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

(TASK STATEMENT) IDENTIFY AND DESIGNATE EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
INK STENCILS RUBBER STAMPS TYPED DESIGNATION STRIPS DECALS TRANSFERS NAME AND LETTER PLATES EQUIPMENT AND APPARATUS SOLVENTS ADHESIVES RULER SQUARE SPECIFICATIONS BLUEPRINTS DRAWINGS	LOCATE CENTERS AND OFFSETS FOR PLACEMENT OF DESIGNATIONS LOGICAL SEQUENCE	SOLVENT VAPORS ADHESIVE VAPORS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
CHEMISTRY, BASIC SOLVENTS AND ADHESIVES	ADDITION AND SUBTRACTION OF WHOLE NUMBERS MULTIPLICATION AND DIVISION OF WHOLE NUMBERS MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/16"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

Duty C Run Cables and Connect Wires

1 Select cable and wire
2 Determine and prepare cable and wire route
3 Cut and identify cables and wires
4 Run cables and wires
5 Secure cables and wires
6 Butt and strip cable
7 Fan conductors
8 Form conductors
9 Strip and connect conductors
10 Climb poles/towers

(TASK STATEMENT) SELECT CABLE AND WIRE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
SPECIFICATIONS MANUALS DRAWINGS WIRE LIST WIRES CABLES	RECOGNIZE OR IDENTIFY CABLE OR WIRE BY SYMBOLS OR CODES ASSIGNED [EXAMPLE: RG-8 COAXIAL CABLE, RWH no. 14 Ga 600V WIRE] RECOGNIZE PHYSICAL DIFFERENCE BETWEEN SINGLE, PAIRED OR QUADED CONDUCTOR WIRES SELECT OR CHOOSE PROPER GAUGE OF CONDUCTOR FOR A SPECIFIC CURRENT OR A MINIMUM VOLTAGE DROP PER UNIT LENGTH	NONE

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT [ELECTRICAL CONDUCTORS]	CIRCULAR MIL AREA, i.e. 700,000 cm WIRE GAUGE i.e. no. 10 AWG	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

(TASK STATEMENT) DETERMINE AND PREPARE CABLE AND WIRE ROUTE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
SPECIFICATIONS, DRAWING, BLUEPRINTS ELECTRIC DRILL ELECTROPNEUMATIC HAMMER DRILL CENTER PUNCH HAMMERS TWIST BITS CARBOLLOY BITS WOOD BITS HARD HAT SAFETY GLASSES HOLE PUNCHES TAP SET LADDER SCAFFOLDING SAWS SCREWDRIVERS WRENCHES HACK SAW DRILL AND BITS CABLE CLAMPS AND SUPPORTING DEVICES BUSHINGS, GROMMETS, INSULATORS	CHOICE OF DRILLING INSTRUMENT TO MATCH COMPOSITION OF MATERIAL RECOGNIZE POSITIONAL MARKS DETERMINE DIAMETER AND DEPTH OF HOLE RELATIONSHIP OF DRILL BIT SIZE TO FASTENER USED CHOOSE PROPER SIZE DRILL AND TAP TO MATCH FASTENER RECOGNIZE AND IDENTIFY EACH UNIT OR PART BY SYMBOL OR CODE ASSIGNED LOGICAL SEQUENCE THE STRATEGY OF CONCEPTUALIZING THE ABSTRACT PARTS TO THEIR WHOLE	DO NOT DRILL THROUGH ANYTHING WITHOUT KNOWING WHAT IS BEHIND THE SURFACE; POSSIBLE DAMAGE TO MATERIALS, PERSONNEL EQUIPMENT LADDER AND SCAFFOLDING
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

(TASK STATEMENT) CUT AND IDENTIFY CABLES AND WIRES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
SPECIFICATIONS MANUALS DRAWINGS WIRE LIST WIRES CABLE CABLE AND WIRE MARKING DEVICES (TAGS–TIE ONS, ETC.) MARKING INSTRUMENTS TAPE MEASURE CABLE AND WIRE CUTTERS	KNOWLEDGE OF KNOTS AND SECURING TECHNIQUES	CUTTING DEVICES
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
NONE	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"]	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATION, TECHNOLOGY]

(TASK STATEMENT) RUN CABLES AND WIRES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
BLUEPRINTS DRAWINGS CABLE AND WIRE MARKING DEVICES FRAME WORK EQUIPMENT CABLE AND WIRE CUTTERS LADDERS SCAFFOLDS FISH TAPES HARD HAT SAFETY GLASSES WIRE LUBRICANT ELECTRICAL TAPE PULLEYS AND ROPES WINCHES	LOGICAL SEQUENCE ROUTE TYPES OF CABLE/WIRE HANDLING OF LOOSE WIRES TO PREVENT TANGLING, KINKING AND DAMAGE	WIRE ENDS LADDERS CUTTERS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Example: LEVERS, GEARS, PULLEYS) WORK INPUT, WORK OUTPUT, FRICTION AND EFFICIENCY IN SIMPLE MACHINES METALLURGY – TENSILE STRENGTH OF WIRES/CABLES EFFECTS OF FRICTION ON WORK PROCESSES AND PRODUCT QUALITY [WIRE OR CABLE TO CONDUIT ;RONWORK AND OTHER CONDUCTORS] RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Exar.ple: BENDING, TWISTING, STRETCHING)	MEASURES OF LENGTHS (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

(TASK STATEMENT) SECURE CABLES AND WIRES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
CABLE AND WIRE SECURING DEVICES SUCH AS CLIPS, CLAMPS, CORD AND TWINE, STRAPS, TAPE, ETC. CUTTERS LADDERS SCAFFOLDING HARD HAT SAFETY GLASSES PLIERS SCREW DRIVERS FASTENERS CABLE SEWING NEEDLES	KNOWLEDGE OF KNOTS AND SECURING TECHNIQUES	CUTTERS LADDERS SCAFFOLDING

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING) RELATIONSHIP OF FORCE TO DISTORTION IN AN ELASTIC BODY	MEASURES OF LENGTHS (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"]	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATION, TECHNOLOGY]

(TASK STATEMENT) BUTT AND STRIP CABLE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
BLUEPRINTS DRAWINGS CABLE AND WIRE MARKING DEVICES FRAME WORK EQUIPMENT CABLE AND WIRE CUTTERS LADDERS SCAFFOLDS HARD HAT SAFETY GLASSES ELECTRICAL TAPE KNIVES STRIPPING TOOLS	LOGICAL SEQUENCE THICKNESS OF INSULATION TO PREVENT DAMAGE TO INTERNAL CONDUCTORS	LADDERS WIRE ENDS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
RELATIONSHIPS OF FORCE TO DISTORTION IN AN ELASTIC BODY RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING)	MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"] READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATION, TECHNOLOGY]

(TASK STATEMENT) FAN CONDUCTORS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
SPECIFICATIONS MANUALS DRAWINGS WIRE LIST WIRES CABLES LADDERS STOOLS SCAFFOLDING FANNING AND FORMING TOOLS BENDING HICKEYS CABE AND WIRE CUTTERS HARD HAT SAFETY GLASSES	RECOGNIZE OR IDENTIFY CABLE OR WIRE BY SYMBOL OR CODE ASSIGNED DISCRIMINATE BETWEEN MULTIPLE COMBINATIONS OF COLOR CODING ON THE WIRES OF MULTIPLE CONDUCTOR CABLES USING A VARIETY OF COLOR COMBINATIONS CUE: COLOR BLINDNESS! LOGICAL SEQUENCE CONCEPT OF ABSTRACT RELATIONSHIP VARYING FROM SITUATION TO SITUATION CUE: CHECK NUMBERING SEQUENCE AND ORDER IN EACH SPECIFIC INSTANCE	WIRE ENDS LADDERS AND SCAFFOLDING CUTTERS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
RELATIONSHIP OF FORCE TO DISTORTION IN AN ELASTIC BODY RESISTANCE OF MATERIAL TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING)	MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"] READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATIONS, TECHNOLOGY]

(TASK STATEMENT) FORM CONDUCTORS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
CABLE AND WIRE SECURING DEVICES SUCH AS CLIPS, CLAMPS, CORD AND TWINE, STRAPS, TAPE, ETC. CUTTERS LADDERS SCAFFOLDING HARD HAT SAFETY GLASSES PLIERS SCREWDRIVERS FASTENERS CABLE SEWING NEEDLES STOOLS FANNING & FORMING TOOLS BENDING HICKEYS CABLE AND WIRE CUTTERS SPECIFICATIONS MANUALS DRAWINGS WIRE LIST WIRES CABLES	KNOWLEDGE OF KNOTS AND SECURING TECHNIQUES LOGICAL SEQUENCE ROUTE TYPES OF CABLE/WIRE HANDLING OF LOOSE WIRES TO PREVENT TANGLING, KINKING AND DAMAGE RECOGNIZE OR IDENTIFY CABLE OR WIRE BY SYMBOL OR CODE ASSIGNED DISCRIMINATE BETWEEN MULTIPLE COMBINATIONS OF COLOR CODING ON THE WIRES OF MULTIPLE CONDUCTOR CABLES USING A VARIETY OF COLOR COMBINATIONS. CUE: COLOR BLINDNESS! LOGICAL SEQUENCE CONCEPT OF ABSTRACT RELATIONSHIPS VARYING FROM SITUATION TO SITUATION. CUE: CHECK NUMBERING SEQUENCE AND ORDER IN EACH SPECIFIC INSTANCE RECOGNIZE AND IDENTIFY TERMINALS, CONNECTORS AND LUGS ON APPARATUS AND CABLES THAT VARIES FROM SITUATION TO SITUATION	WIRE ENDS LADDERS AND SCAFFOLDING CUTTERS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Example: BENDING, TWISTING, STRETCHING) RELATIONSHIP OF FORCE TO DISTORTION IN AN ELASTIC BODY MOTION RESULTING FROM TWO OR MORE FORCES ACTING ON A POINT IN A BODY	MEASURING IN LENGTHS (Example: INCHES, FEET, ETC.) [STANDARD RULER TO 1/32"] READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATION, TECHNOLOGY]

(TASK STATEMENT) STRIP AND CONNECT CONDUCTORS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Cable and wire securing devices such as clips, clamps, cord and twine, straps, tape, etc. Cutters Ladders Scaffolding Hard hat Safety glasses Pliers Screwdrivers Fasteners Cable sewing needles Blueprints Connecting charts Wiring sketches Soldering iron Crimping devices Wire wrap tool Allen wrenches Wire stripping tools Lugs and terminals Wrenches	Recognize or identify cable or wire by symbol or code assigned Discriminate between multiple combinations of color coding on the wires of multiple conductor cables using a variety of color combinations; Cue: color blindness Know logical sequence Know concepts of abstract relationships varying from situation to situation; Cue: check numbering sequence and order in each specific instance Handling of loose wires to prevent tangling, kinking and damage Discrimination of the appearance, position and condition of the wire and associated lug to conform to acceptable quality standards (National Electric Code, MIL specifications, etc.) Have concepts and develop strategies to perform operations in a manner to safeguard equipment and service Perform critical visual and tactile discrimination on the following: Coaxial connectors and conductors Compression fittings Solder lugs Clamps Swages fittings, e.g., amp lugs	Electrical shock Burns Electrical damage to apparatus

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
Effect of heating and cooling on expansion of materials (change of dimensions) Effects of heating and cooling on state of matter (change of matter from one form to another) Transfer of heat from one body to another Effects of friction on work processes and product quality Relationship of force to distortion in an elastic body [wire conductors only] Metallurgy–solder, oxidation	Measures of length [standard ruler to 1/32"] Read and interpret charts, tables and/or graphs	Reading comprehension [Blueprint and drawing comprehension] Technical terminology [Vocabulary, abbreviation, technology]

(TASK STATEMENT) CLIMB POLES/TOWERS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
BODY BELT CLIMBERS GLOVES GAUNLET HARD HAT LONG SLEEVE SHIRT HIGH SHOES OR BOOTS POLE PROD AC GROUND ROD TESTER GIN POLE ROPE AND PULLEYS HARD HAT AND GLASSES RUBBER GOODS (GLOVES, BLANKETS) HOT STICK HAMMER WRENCHES SCREWDRIVERS PLIERS DRILLS AND BITS SAW FILE SPUR GAUGE	CARE OF CLIMBERS STRAPS AND BODY BELT BE ABLE TO DETERMINE THE "CONDITION" OF A POLE OR TOWER BY VISUAL AND TACTILE INSPECTION LOCATING AND MOUNTING OF EQUIPMENT, APPARATUS, CABLES, GUY WIRES, ETC.	ELECTRICAL SHOCK ENVIRONMENTAL OBSTRUCTIONS CHEMICAL BURNS PUNCTURE WOUNDS (SPLINTERS)

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Example: LEVERS, GEARS, PULLEYS) [MOMENT OF FORCE, STATICS, VECTOR NATURE OF A FORCE]	ADDITION AND SUBTRACTION OF WHOLE NUMBERS MEASURES OF LENGTH (Example: INCHES, FEET, ETC.) UNDERSTANDING AND USE OF THE PYTHAGOREAN THEOREM, BASED ON THE RIGHT TRIANGLE Example: $a^2 + b^2 = c^2$ USE OF TRIGONOMETRIC FUNCTIONS IN SOLUTION OF PROBLEMS INVOLVING RIGHT TRIANGLES	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] TECHNICAL TERMINOLOGY [VOCABULARY, ABBREVIATION, TECHNOLOGY] RECOMMENDATION REPORT – ORAL [INFORMAL ORAL RECOMMENDATIONS AND REPORTS]

(TASK STATEMENT) PERFORM CONTINUITY TESTS AND RESISTANCE MEASUREMENTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
BUZZERS LIGHTS OHM METERS LADDERS STOOLS SCAFFOLDING HARD HAT SAFETY GLASSES DRAWINGS WIRING SWITCHES MANUALS SPECIFICATIONS	RECOGNIZE OR IDENTIFY CABLE OR WIRE BY SYMBOL OR CODE ASSIGNED LOGICAL SEQUENCE DISCRIMINATE BETWEEN MULTIPLE COMBINATIONS OF COLOR CODING ON THE WIRES OF MULTIPLE CONDUCTOR CABLES USING A VARIETY OF COLOR COMBINATIONS. CUE: COLOR BLINDNESS! ANALYZE TROUBLE INDICATIONS TO MARK DETAILED ENTRIES ON TEST RECORDS OR TROUBLE REPORTS CONCEPT OF ABSTRACT RELATIONSHIPS VARYING FROM SITUATION TO SITUATION CUE: CHECK NUMBERING SEQUENCE AND ORDER IN EACH SPECIFIC INSTANCE DISCRIMINATION OF THE APPEARANCE POSITION AND CONDITION OF THE WIRE AND ASSOCIATED LUG TO CONFORM TO ACCEPTABLE QUALITY STANDARDS HAVE CONCEPTS AND DEVELOP STRATEGIES TO PERFORM OPERATIONS IN A MANNER TO SAFE-GUARD EQUIPMENT AND SERVICE.	HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, SIGNIFICANT DIGITS AND TOLERANCE (CONTINUITY ONLY)	READING COMPREHENSIONS (BLUEPRINT AND DRAWING COMPREHENSION) RECOMMENDATION REPORT – ORAL (INFORMAL ORAL RECOMMENDATIONS AND REPORTS) TECHNICAL TERMINOLOGY (VOCABULARY – TECHNICAL; ABBREVIATION) COMPLETING REPORTS PENMANSHIP

Duty D Perform Basic Tests on Equipment

1 Perform continuity and resistance measurements
2 Apply power and install fuses
3 Routine and functional testing of equipment

(TASK STATEMENT) APPLY POWER AND INSTALL FUSES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
TEST RECEIVER - (HEADSET WITH TEST PICKS) VOLTMETER TEST LIGHT FUSES SAFETY GLASSES EQUIPMENT AND APPARATUS SPECIFICATIONS DRAWINGS MANUALS LADDERS STOOLS LUBRICANTS ABRASIVE PAPERS FILES	IDENTIFY AND SELECT FUSES AND FUSING POSITIONS BASED ON A VARIETY OF CODING SYSTEMS THAT VARIES FROM SITUATION TO SITUATION, i.e. 3 AG, MDL-3, 70 and 35 TYPE, ETC. SELECT TEST ACCESS POINTS TO DETERMINE PROPER VOLTAGES ON A VARIETY OF APPARATUS AND EQUIPMENT CONFIGURATIONS ANALYZE TROUBLE INDICATIONS TO MAKE DETAILED ENTRIES ON TEST RECORDS AND TROUBLE REPORTS	HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, TOLERANCE AND SIGNIFICANT DIGITS [VOLTAGE AND CURRENT MEASUREMENTS]	READING COMPREHENSION [BLUEPRINT & DRAWING COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS & REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION COMPLETE REPORTS PENMANSHIP

(TASK STATEMENT) ROUTINE AND FUNCTIONAL TESTING OF EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
TEST RECEIVER - (HEADSET WITH TEST PICKS) VOLTMETER TEST LIGHT SAFETY GLASSES FUSES EQUIPMENT AND APPARATUS SPECIFICATIONS DRAWINGS MANUALS LADDERS STOOLS SCHEMATICS TEST METHODS	RECOGNIZE AND IDENTIFY APPARATUS AND COMPONENTS BASED ON A VARIETY OF CODING SYSTEMS THAT VARIES FROM SITUATION TO SITUATION LOGICAL SEQUENCE OF CIRCUIT OPERATIONS APPLICATION OF ABSTRACT ELECTRONIC THEORY TO A BROAD RANGE OF CIRCUIT CONFIGURATIONS ANALYZE TROUBLE INDICATIONS TO MAKE DETAILED ENTRIES ON TEST RECORDS OR TROUBLE REPORTS	HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT MAGNETIC FIELDS OF FORCE TRANSFER OF ENERGY FROM ONE FORM TO ANOTHER (Example: POTENTIAL TO KINETIC.)	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, TOLERANCE AND SIGNIFICANT DIGITS [VOLTAGE, CURRENT AND RESISTANCE MEASUREMENTS ONLY]	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS AND REPORTS REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION] COMPLETING REPORTS PENMANSHIP INTREPRETING SCHEMATICS AND SYMBOLS, COMPREHENSION OF FUNCTIONAL AND CIRCUIT DESCRIPTION STATEMENTS

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Duty E Perform Complex Tests

1 Test circuit operations
2 Perform transmission and noise measurements
3 Perform current and power measurements

(TASK STATEMENT) TEST CIRCUIT OPERATIONS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statement
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequence meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.

PERFORMANCE KNOWLEDGE

Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation
Application of abstract electronic theory to a broad range of circuit configurations
Logical sequence of circuit operations
Analyze trouble indications to make detailed entries on test records or trouble reports
Analyze and comprehend complex circuit operations and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input/output responses fall within specified parameters
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
FCC license where applicable

SAFETY – HAZARD

Hazardous voltages and currents
Ladders and scaffolds

SCIENCE

Magnetic fields of force

Transfer of energy from one form to another

Resistance of materials to flow of electrical current

MATH – NUMBER SYSTEMS

Read and interpret charts, tables and/or graphs

Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance

Manipulation of formula involving three factors
[Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

Reading comprehension
[Bleuprint and drawing comprehension]

Recommendation report—oral
[Informal oral recommendations and reports]

Technical terminology
[Vocabulary-technical; abbreviations]

Completing reports

Penmanship

Interpret schematics and symbols, comprehension of functional and circuit description statements

(TASK STATEMENT) PERFORM TRANSMISSION MEASUREMENTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meters
Attenuators
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
Oscilloscope, i.e., Tecktronics, 545 or equivalent
Audio generators
RF Sig generators to 30 MH_z (general application)
VU meters
RF power meters
Field strength meter
RF Sig generator to 500 MH_z (for two-way radio)
Dummy load

PERFORMANCE KNOWLEDGE

Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation
Logical sequence of circuit operations
Application of abstract electronic theory to a broad range of circuit configurations
Analyze trouble indications to make detailed entries on test records or trouble reports
Analyze and comprehend complex circuit operations and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input/output responses fall within specified parameters
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics:
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, swept frequency measurements
Interpret and apply the following terms: VSWR, dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation
FCC regulations and licenses where applicable

SAFETY — HAZARD

Hazardous voltages and currents
Ladders and scaffolds

Hazard to delicate apparatus through the application of foreign or excessive voltages or currents

SCIENCE

The electro-magnetic spectrum wave propagation

Magnetic fields of force

Transfer of energy from one form to another

Resistance of materials to flow of electrical current

MATH — NUMBER SYSTEMS

Read and interpret charts, tables and/or graphs

Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance

Ratio and proportion

Addition and subtraction of decimal fractions
Addition of positive and negative numbers

Manipulation of formula involving three factors
(Ohm's Law)

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

Reading comprehension
[Blueprint and drawing comprehension]

Recommendation report—oral
[Informal oral recommendations and reports]

Technical terminology
[Vocabulary—technical, abbreviations]

Completing reports

Penmanship

Interpreting schematics and symbols, comprehension of functional and circuit description statements

(TASK STATEMENT) PERFORM CURRENT AND POWER MEASUREMENTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
Power/watt meter

PERFORMANCE KNOWLEDGE

Recognize and make a distinction between various types of storage batteries, i.e., lead-acid, ni-cad, carbon-zinc, etc.
Conceptual application of the following topics:
Dissipation of heat; charge and discharge of secondary cells; Power supplies–rectification; Filtering and regulation; Shunts and loads; Impedance matching
Analyze trouble indications to make detailed entries on test records or trouble reports
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling–In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics:
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR; dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation
FCC regulations and licenses where applicable

SAFETY – HAZARD

Hazardous voltages and currents
Ladders and scaffolds
Radiation of microwave energy
Hazard to delicate apparatus through the application of foreign or excessive voltages or currents
Dangers associated with acids and caustic solutions
Explosion hazards–hydrogen from batteries being charged

SCIENCE

The electro-magnetic spectrum wave propagation

Magnetic fields of force

Transfer of energy from one form to another [batteries]

Resistance of materials to flow of electrical current [electrical conductors]

MATH – NUMBER SYSTEMS

Read and interpret tables, charts and/or graphs

Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance

Ratio and proportion

Addition and subtraction of decimal fractions
Addition of positive and negative numbers

Manipulation of formula involving three factors [Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

Reading comprehension
[Blueprint and drawing comprehension]

Recommendation report–oral
[Informal oral recommendations and reports]

Technical terminology

Completing reports

Penmanship

Interpret schematics and symbols, comprehension of functional and circuit description statements

Duty F Troubleshoot Equipment

1 Interpret trouble indicators
2 Locate malfunctioned apparatus or device
3 Make arrangements to maintain service
4 Set up and use test apparatus to make diagnostic tests to locate trouble
5 Repair or replace defective components, wire, etc.
6 Apply tests to determine if unit operates properly
7 Place unit back in service

(TASK STATEMENT) INTERPRET TROUBLE INDICATORS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
TROUBLE REPORTS ALARM/DISPLAY INDICATORS TELETYPE UNIT TELEPHONE ALL OPERATING EQUIPMENT AND APPARATUS INVOLVED WITH THE SYSTEM	DISCRIMINATE BETWEEN THE VARIETY OF TROUBLE INDICATORS AND THE MAGNITUDE OF THEIR IMPORTANCE AND URGENCY	IMPROPER INTERPRETATION OR LACK OF RECOGNITION OF SYMBOLS OR CODING CAN RESULT IN DAMAGE TO EQUIPMENT OR BE A HAZARD TO PERSONNEL
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
TRANSFER OF HEAT FROM ONE BODY TO ANOTHER. [UNIT OVERHEATING] RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT [ELECTRICAL CONDUCTORS]	READ AND INTERPRET CHARTS, TABLES AND/OR GRAPHS GIVEN A CODING SYSTEM, RECOGNIZE AND IDENTIFY EACH UNIT INVOLVED BY ASSIGNING NECESSARY SYMBOLS, NUMERICAL OR LITERAL	RESPOND TO VERBAL INSTRUCTIONS INTERPRET VISUAL AND AURAL INDICATORS INTERPRET WRITTEN TROUBLE REPORTS INTERPRET THE SOUNDS OF MALFUNCTIONING EQUIPMENT AND DEVICES INTERPRET VISUAL INDICATION OF MALFUNCTIONING EQUIPMENT MAKE A DISCRIMINATION CONCERNING EXCESSIVE HEAT AND FOREIGN ODORS COMMUNICATE WITH OTHERS COMPLETE SIMPLE REPORTS DETAILS AND INFERENCE; LOGIC; APPROPRIATE DICTION; CLARITY OF EXPRESSION; USAGE; SPELLING; TECHNICAL TERMINOLOGY; DICTATION; ENUNCIATION

(TASK STATEMENT) LOCATE MALFUNCTIONAL APPARATUS OR DEVICE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltage and current instruments, status indicators, display panels, etc.
Trouble reports
Alarm/display indicators
Teletype unit
Telephone
All operating equipment and apparatus involved with the system
Transportation

PERFORMANCE KNOWLEDGE

Know strategy of conceptualizing the abstract relationships of parts of a circuit to the complete system for the purpose of establishing a logical sequence of operation
Recognize and identify each unit and circuit involved by assigned coding systems that use a variety of symbols and alpha-numeric abbreviations
Have a conceptual understanding and be able to apply the following principles:
Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics:
Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation
FCC regulations and licenses where applicable

SAFETY – HAZARD

Hazard to service, equipment and personnel by incorrect identification of equipment or apparatus and circuit assignments

SCIENCE

Magnetic fields fo force

Resistance of materials to flow of electrical current [electrical conductors]

Wave propagation

The electro-magnetic spectrum

MATH – NUMBER SYSTEMS

Read and interpret charts, tables and/or graphs

Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits tolerance

Manipulation of formula involving three factors [Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

Reading comprehension
[Blueprint and drawing comprehension]

Recommendation report—oral
[Informal oral recommendations and reports]

Technical terminology
[Vocabulary-technical; abbreviations]

Completing reports

Penmanship

Interpret schematics and symbols, comprehension of functional and circuit description statements

(TASK STATEMENT) MAKE ARRANGEMENTS TO MAINTAIN SERVICE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

- Schematics
- Drawings
- Specifications
- Manuals
- Circuit description statements
- Test methods and procedures
- Voltmeters
- Ohmmeters
- Ammeters
- Frequency meter
- Attenuators
- Dummy loads
- Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltage and current instruments, status indicators, display panels, etc.
- Trouble reports
- Alarm/display indicators
- Telephone
- Teletype
- Spare equipment and apparatus
- Temporary cable and connectors
- All operating equipment and apparatus involved with the system
- Transportation

PERFORMANCE KNOWLEDGE

- Know the strategy of conceptualizing the abstract relationship of parts of a circuit to the complete system for the purpose of establishing a logical sequence of operations
- Recognize and identify each unit and circuit involved by assigned coding systems that use a variety of symbols and alpha-numeric abbreviations
- Have a conceptual understanding and be able to apply the following principles:
  Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
- Have a conceptual understanding of the electrical needs of the system and its demands on sub-systems, modules and components to facilitate the replacement or making of a choice of alternatives
- Conceptual application of the following topics:
  Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
- Interpret and apply the following terms: VSWR; dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation
- FCC regulations and licenses where applicable

SAFETY – HAZARD

- Hazard to service, equipment and personnel by incorrect identification of equipment or apparatus and circuit assignments

SCIENCE

- Magnetic fields of force
- Resistance of materials to flow of electrical current [electrical conductors]
- Wave propagation
- The electro-magnetic spectrum

MATH – NUMBER SYSTEMS

- Read and interpret charts, tables and/or graphs
- Given an instrument of measure, determine precision and/or accuracy, with respect to relative error, significant digits, and tolerance
- Manipulation of formula involving three factors [Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

- Reading comprehension [Blueprint and drawing comprehension]
- Recommendation report—oral [Informal oral recommendations and reports]
- Technical terminology [Vocabulary-technical; abbreviations]
- Completing reports
- Penmanship
- Interpret schematics and symbols, comprehension of functional and circuit description statements

(TASK STATEMENT) SET UP AND USE TEST APPARATUS TO MAKE DIAGNOSTIC TESTS TO LOCATE TROUBLE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

- Schematics
- Drawings
- Specifications
- Manuals
- Circuit description statements
- Test methods and procedures
- Voltmeters
- Ohmmeters
- Ammeters
- Frequency meter
- Attenuators
- Dummy loads
- Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
- Trouble reports
- Alarm/display indicators
- Teletype unit
- Telephone
- All operating equipment and apparatus involved with the system
- Power/watt meter

PERFORMANCE KNOWLEDGE

- Know strategy of conceptualizing the abstract relationships of parts of a circuit to the complete system for the purpose of establishing a logical sequence of operations
- Recognize and identify each unit and circuit involved by assigned coding systems and alpha-numeric abbreviations
- Have a conceptual understanding and be able to apply the following principles: Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling–In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
- Make precision voltage, current, resistance and waveform measurements for the purpose of determining components malfunctioning or failure
- Conceptual application of the following trouble-shooting techniques: Splitting/Isolation; Substitution/Frogging; Comparative measurements
- Conceptual application of the following topics: Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
- Interpret and apply the following terms: VSWR; dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation
- FCC regulations and licenses where applicable

SAFETY – HAZARD

- Hazardous voltages and currents
- Ladders and scaffolds
- Hazards to delicate apparatus through the application of foreign or excessive voltages or currents
- Radiation of microwave energy

SCIENCE

- Magnetic fields of force
- Resistance of materials to flow of electrical current [electrical conductors]
- Transfer of energy from one form to another [batteries]

MATH – NUMBER SYSTEMS

- Read and interpret tables, charts and/or graphs
- Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance
- Ratio and proportion
- Addition and subtraction of decimal fractions
- Addition of positive and negative numbers
- Manipulation of formula involving three factors [Ohm's Law]

$$I = \frac{E}{R}$$

$$E = I \times R$$

$$R = \frac{E}{I}$$

COMMUNICATIONS

- Respond to verbal instructions
- Interpret visual and aural indicators
- Interpret written trouble reports
- Interpret the sounds of malfunctioning equipment and devices
- Interpret visual indications of malfunctioning equipment
- Make a discrimination concerning excessive heat and foreign odors
- Communication with others, complete simple reports
- Details and inference; logic; appropriate diction; clarity of expression; usage; spelling; technical terminology; dictation; enunciation
- Reading comprehension [Blueprint and drawing comprehension]
- Recommendation report-oral [Informal oral recommendations and reports]
- Technical terminology [Vocabulary-technical; abbreviations]
- Completing reports
- Penmanship
- Interpret schematics and symbols, comprehension of functional and circuit description statements

(TASK STATEMENT) REPAIR OR REPLACE DEFECTIVE COMPONENTS, WIRE, PARTS, ETC.

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
MANUALS DRAWINGS CHARTS SCREWDRIVERS WIRE CUTTERS PLIERS SOLDERING IRONS WIRE WRAPPING TOOLS WRENCHES ROPE AND CHAIN HOISTS DRIFT PIN BURNISHERS CONTACT ADJUSTING TOOLS CLEANING TOOLS SAFETY GLASSES LUBRICANTS	RECOGNIZE AND IDENTIFY APPARATUS AND COMPONENTS BASED ON A VARIETY OF CODING SYSTEMS THAT VARIES FROM SITUATION TO SITUATION LOGICAL SEQUENCE OF CIRCUIT OPERATIONS APPLICATION OF ABSTRACT ELECTRONIC THEORY TO A BROAD RANGE OF CIRCUIT CONFIGURATIONS ANALYZE TROUBLE INDICATIONS TO MAKE DETAILED ENTRIES ON TEST RECORDS OR TROUBLE REPORTS CAREFULLY OBSERVE OR RECORD THE ORIGINAL APPEARANCE AND LOCATION OF WIRES AND COMPONENTS TO ALLOW FOR RECALL SO THAT REPLACEMENT WILL CONFORM TO ORIGINAL CONFIGURATION MAKE PRECISION VOLTAGE, CURRENT, RESISTANCE AND WAVEFORM MEASUREMENTS TO DETERMINE AND EVALUATE THE CORRECTIVE ACTION FCC LICENSE WHERE APPLICABLE	HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS HAZARDS TO DELICATE APPARATUS THROUGH THE APPLICATION OF FOREIGN OR EXCESSIVE VOLTAGES OR CURRENTS RADIATION OF MICROWAVE ENERGY SOLVENT VAPORS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
EFFECT OF HEATING AND COOLING ON EXPANSION OF MATERIALS (CHANGE OF DIMENSIONS) [SOLDERING] EFFECT OF HEATING AND COOLING ON STATE OF MATTER (CHANGE OF MATTER FROM ONE FORM TO ANOTHER) [SOLDERING] TRANSFER OF HEAT FROM ONE BODY TO ANOTHER [SOLDERING] SIMPLE MACHINES USED TO GAIN MECHANICAL ADVANTAGE (Examples: LEVERS, GEARS, PULLEYS) WORK INPUT, WORK OUTPUT, FRICTION AND EFFICIENCY IN SIMPLE MACHINES	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, TOLERANCE AND SIGNIFICANT DIGITS GIVEN A CODING SYSTEM, RECOGNIZE AND IDENTIFY EACH UNIT INVOLVED BY ASSIGNING NECESSARY SYMBOLS, NUMERICAL OR LITERAL	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS AND REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION] COMPLETING REPORTS PENMANSHIP

(TASK STATEMENT) APPLY TESTS TO DETERMINE IF UNIT OPERATES PROPERLY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Schematics Drawings Specifications Manuals Circuit description statement Test methods and procedures Voltmeters Ohmmeters Ammeters Frequency meter Attenuators Dummy loads Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.	Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation Logical sequence of circuit operations Application of abstract electronic theory to a broad range of circuit configurations Analyze trouble indications to make detailed entries on test records or trouble reports Have a conceptual understanding and be able to aply the following principles: Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling–In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance Conceptual application of the following topics: Complex waveforms, noise, wave characteristics; dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements Interpret and apply the following terms: VSWR; dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation Perform functional tests and make adjustments so that operation conforms to the electrical and physical needs of the system Analyze and comprehend complex circuit operations and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input/output responses fall within specified parameters FCC license where applicable	Hazardous voltages and currents Ladders and scaffolds Hazard to delicate apparatus through the application of foreign or excessive voltages or currents Radiation of microwave energy

SCIENCE	MATH – NUMBER SYSTEMS	COMMUNICATIONS
Magnetic fields of force Transfer of energy from one form to another [relays and solenoids] Resistance of materials to flow of electrical current [electrical conductors]	Read and interpret charts, tables and/or graphs Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance Ratio and proportion Addition of positive and negative numbers Addition and subtraction of decimal fractions Manipulation of formula involving three factors [Ohm's Law] $I = \frac{E}{R}$ $E = I \times R$ $R = \frac{E}{I}$	

(TASK STATEMENT) PLACE UNIT BACK IN SERVICE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Schematics Drawings Specifications Manuals Circuit description statements Test methods and procedures Voltmeters Ohmmeters Ammeters Frequency meter Attenuators Dummy loads Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc. Trouble reports Alarm/display indicators Teletype unit Telephone All operating equipment and apparatus involved with the system Transportation Spare equipment and apparatus Temporary cable and connectors	Know the strategy of conceptualizing the abstract relationships of parts of a circuit to the complete system for the purpose of establishing a logical sequence of operations Recognize and identify each unit and circuit involved by assigned coding systems that use a variety of symbols and alpha-numeric abbreviations Observe or record original appearance and location of wires and components to allow for recall so that replacement will conform to original configuration Have a conceptual understanding and be able to apply the following principles: Phantom and simplex circuits; Metallic and non-metallic circuits; Earth potential compensation; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling–In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance Conceptual application of the following topics: Complex waveforms noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements Interpret and apply the following terms: VSWR; dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation FCC regulations and licenses where applicable	Improper interpretation or lack of recognition of symbols or codes can result in damage to equipment or be a hazard to personnel Hazard to delicate apparatus through the application of foreign or excessive voltages or currents Radiation of microwave energy Hazardous voltages and currents Ladders and scaffolds
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
Magnetic fields of force Resistance of materials to flow of electrical current [electrical conductors] Wave propagation The electro-magnetic spectrum	Read and interpret tables, charts and/or graphs Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance Manipulation of formula involving three factors [Ohm's Law] $I = \frac{E}{R}$ $E = I \times R$ $R = \frac{E}{I}$	Reading comprehension [Blueprint and drawing comprehension] Recommendation report–oral [Informal oral recommendations and reports] Technical terminology [Vocabulary-technical; abbreviations] Completing reports Penmanship

Duty G Perform Maintenance, Modification and Repair of Equipment

1 Inspect equipment
2 Clean and lubricate equipment
3 Adjust equipment
4 Repair and modify equipment

(TASK STATEMENT) INSPECT EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
SCHEMATICS DRAWINGS SPECIFICATIONS MANUALS CIRCUIT DESCRIPTION STATEMENTS TEST METHODS AND PROCEDURES VOLTMETERS OHMMETERS AMMETERS FREQUENCY METER ATTENUATORS DUMMY LOADS SPECIAL TEST SETS WHICH REQUIRE THE MANIPULATION OF COMPLEX KEYS, SWITCHES AND CONTROLS THAT UTILIZE SENDING AND RECEIVING CIRCUITS, VOLTAGES AND CURRENT INSTRUMENTS, STATUS INDICATORS, DISPLAY PANELS, ETC.	MAKE PRECISION VOLTAGE, CURRENT, RESISTANCE AND WAVEFORM MEASUREMENTS TO DETERMINE PROPER OPERATIONS MAKE CRITICAL VISUAL AND TACTILE DISCRIMINATIONS OF CLOSE TOLERANCES (i.e. 0.001 inch) WORN PARTS, DETERIORATING INSULATION, LEVELS OF FLUID, SURFACE CONDITIONS, DRIED LUBRICANTS	MOVING PARTS OF EQUIPMENT SUBJECT TO REMOTE OR AUTOMATIC START HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
MAGNETIC FIELDS OF FORCE TRANSFER OF ENERGY FROM ONE FORM TO ANOTHER. (Example: POTENTIAL TO KINETIC) [RELAYS AND SOLENOIDS] RESISTANCE OF MATERIALS TO FLOW OF ELECTRICAL CURRENT [ELECTRICAL CONDUCTORS] METALLURGY - CORROSION AND ELECTROLYSIS MOTION RESULTING FROM TWO OR MORE FORCES ACTING ON A POINT IN A BODY (Example: EQUAL AND OPPOSITE FORCE IS APPLIED BY TWO BODIES IN CONTACT WITH EACH OTHER [MOTORS, RELAYS, SWITCHES, ETC.]	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, SIGNIFICANT DIGITS AND TOLERANCE	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS AND REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION] COMPLETING REPORTS PENMANSHIP INTERPRETING SCHEMATICS AND SYMBOLS, COMPREHENSION OF FUNCATIONAL AND CIRCUIT DESCRIPTION STATEMENTS

(TASK STATEMENT) CLEAN AND LUBRICATE EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
MANUALS SPECIFICATIONS PROCEDURE GUIDES DUST CLOTHS SOLVENTS DUSTING BRUSHES DETERGENTS AIR GUN UP TO 30 p.s.i. VACUUM CLEANER LUBRICANTS BRUSHES LUBRICANT DISPENSERS	MAKE VISUAL AND TACTILE DISCRIMINATIONS OF THE SURFACE CONDITIONS OF PARTS, ELECTRICAL CONTACTS, TERMINALS, CABLES AND WIRES, ETC. MAKE A VISUAL DISCRIMINATION OF THE AMOUNT OF LUBRICANT APPLIED TO WEAR POINTS	HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS MOVING PARTS OF EQUIPMENT SUBJECT TO REMOVE OR AUTOMATIC START SOLVENT VAPORS HAZARD TO DELICATE APPARATUS THROUGH THE MISUSE OF CLEANING DEVICES
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
CHEMISTRY - CHOICE OF SOLVENTS	LIQUID AND DRY MEASURES [LIQUID ONLY]	READING COMPREHENSION [BLUEPRING AND DRAWING COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS AND REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION] COMPLETING REPORTS PENMANSHIP

(TASK STATEMENT) ADJUST EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
MANUALS SPECIFICATIONS PROCEDURE GUIDES SCHEMATICS SCREWDRIVER TUNING TOOLS	MAKE CRITICAL VISUAL AND TACTILE MEASUREMENTS AND ADJUSTMENTS HANDLE AND USE DELICATE MEASURING INSTRUMENTS IN SUCH A MANNER TO INSURE THEIR PRECISION VERIFY THE PRECISION OF MEASURING INSTRUMENTS BY CALIBRATION AND OTHER VALIDATION TECHNIQUES	MOVING PARTS OF EQUIPMENT SUBJECT TO REMOTE OR AUTOMATIC START HAZARDOUS VOLTAGES AND CURRENTS LADDERS AND SCAFFOLDS HAZARD TO EQUIPMENT OR APPARATUS THROUGH THE MISUSE OF ADJUSTING TOOLS
SCIENCE	**MATH – NUMBER SYSTEMS**	**COMMUNICATIONS**
RESISTANCE OF MATERIALS TO CHANGE IN SHAPE (Examples: BENDING, TWISTING, STRETCHING) [SPRING TENSION]	READ AND INTERPRET CHARTS, TABLES, AND/OR GRAPHS GIVEN AN INSTRUMENT OF MEASURE, DETERMINE PRECISION AND/OR ACCURACY WITH RESPECT TO RELATIVE ERROR, TOLERANCE AND SIGNIFICANT DIGITS MEASURE OF TIME AND SPEED (Example: TIME–SECONDS, MINUTES, ETC.; SPEED–FEET PER MINUTE, R.P.M., ETC.) [CONTACT CLOSURE, SPEED, SEQUENTIAL SWITCHING]	READING COMPREHENSION [BLUEPRINT AND DRAWING COMPREHENSION] RECOMMENDATION REPORT - ORAL [INFORMAL ORAL RECOMMENDATIONS AND REPORTS] TECHNICAL TERMINOLOGY [VOCABULARY - TECHNICAL; ABBREVIATION] COMPLETING REPORTS PENMANSHIP INTERPRETING SCHEMATICS AND SYMBOLS, COMPREHENSION OF FUNCTIONAL AND CIRCUIT DESCRIPTION STATEMENTS

(TASK STATEMENT) REPAIR AND MODIFY EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON

Schematics
Drawings
Specifications
Manuals
Circuit description statements
Test methods and procedures
Voltmeters
Ohmmeters
Ammeters
Frequency meter
Attenuators
Dummy loads
Special test sets which require the manipulation of complex keys, switches and controls that utilize sending and receiving circuits, voltages and current instruments, status indicators, display panels, etc.
Charts
Screwdrivers
Wire cutters
Pliers
Soldering irons
Wire wrapping tools
Wrenches
Rope and chain hoists
Drift pin
Burnishers
Contact adjusting tools
Cleaning tools
Lubricants

PERFORMANCE KNOWLEDGE

Carefully observe or record the original appearance and location of wires and components to allow for recall so that replacement will conform to original configurations
Make precision voltage, current, resistance and waveform measurements to determine and evaluate the corrective action
Perform functional tests and make adjustments so that operation conforms to the electrical and physical needs of the system
Recognize and identify apparatus and components based on a variety of coding systems that vary from situation to situation
Logical sequence of circuit operations
Application of abstract electronic theory to a broad range of circuit configurations
Analyze trouble indications to make detailed entries on test records or trouble reports
Analyze and comprehend complex circuit operations and response capabilities to determine proper test access points and sequence of testing procedures and to determine if input/output responses fall within specified parameter
Have a conceptual understanding and be able to apply the following principles: Phantom and simplex circuits; Hybrid circuits; Phase shift; Impedance matching; Chain and sequence circuits; Signaling—In band, SF, etc.; Inductive and capacitive reactance; Ohm's Law; Impedance
Conceptual application of the following topics: Complex waveforms, noise, wave characteristics, dielectrics, standing wave ratio, analog/digital signals, sweep frequency measurements
Interpret and apply the following terms: VSWR dBm, dBo, dBw, dBv, dBrn, dBa; VU; gain; loss; attenuation
FCC regulations and licenses where applicable

SAFETY – HAZARD

Hazard to delicate apparatus through the application of foreign or excessive voltages or currents
Radiation of microwave energy
Hazardous voltages and currents
Ladders and scaffolds
Safety glasses

SCIENCE

Effect of heating and cooling on expansion of materials (change of dimensions [soldering]

Effect of heating and cooling on state of matter (changing of matter from one form to another) [soldering]

Transfer of heat from one body to another [soldering]

Simple machines used to gain mechanical advantage

Work input, work output, friction and efficiency in simple machines

Magnetic fields of force

Resistance of materials to flow of electrical current [electrical conductors]

Transfer of energy from one form to another [relays and solenoids]

MATH – NUMBER SYSTEMS

Addition and subtraction of decimal fractions
Addition of positive and negative numbers

Ratio and proportion

Read and interpret tables, charts and/or graphs

Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits and tolerance

Given a coding system, recognize and identify each unit involved by assigning necessary symbols, numerical or literal

Manipulation of formula involving three factors [Ohm's Law]

$I = \frac{E}{R}$ $R = \frac{E}{I}$

$E = I \times R$

COMMUNICATIONS

Reading comprehension [Blueprint and drawing comprehension]

Recommendation report—oral [Informal oral recommendations and reports]

Technical terminology [Vocabulary-technical; abbreviations]

Completing reports

Penmanship